

Mitochondria: Practical Protocols

Edited by

Dario Leister

Department für Biologie I, Botanik, Ludwig-Maximilians-Universität München, München, Germany

Johannes M. Herrmann

Zellbiologie, Universität Kaiserslautern, Kaiserslautern, Germany

Mitochondria: Practical Protocols offers a broad collection of methods for studying the molecular biology, function, and features of mitochondria. In the past decade, mitochondrial research has elucidated the important influence of mitochondrial processes on integral cell processes such as apoptosis and cellular aging. This practical guide presents a wide spectrum of mitochondrial methods, each written by specialists with solid experience and intended for implementation by novice and expert researchers alike.

Part I introduces major experimental model systems and discusses their specific advantages and limitations for functional analysis of mitochondria. The concise overview of general properties of mitochondrial systems is supplemented by detailed protocols for cultivation of model organisms. Parts II–VI comprise a robust collection of protocols for studying different molecular aspects of mitochondrial functions including: genetics and microbiology, biochemistry, physiology, dynamics and morphology, and functional genomics. Emphasis is placed on new and emerging topics in mitochondrial study, such as the examination of apoptotic effects, fusion and fission of mitochondria, and proteome and transcriptome analysis.

FEATURES

- Comprehensive lab manual for mitochondrial research
- Introduction to different model organisms for studying mitochondrial function
- Fusion and fission of mitochondria
- Biogenesis of mitochondria
- Detailed overview of functional genomic approaches for studying mitochondrial function

CONTENTS

Part I. Model Systems to Study Mitochondrial Functions. The Mitochondria of Cultured Mammalian Cells: I. Analysis by Immunofluorescence Microscopy, Histochemistry, Subcellular Fractionation, and Cell Fusion. The Mitochondria of Cultured Mammalian Cells: II. Expression and Visualization of Exogenous Proteins in Fixed and Live Cells. *Drosophila melanogaster* as a Model System to Study Mitochondrial Biology. Isolation and Functional Analysis of Mitochondria From the Nematode *Caenorhabditis elegans*. Isolation of Mitochondria From Procyclic *Trypanosoma brucei*. *Saccharomyces cerevisiae* as a Model Organism to Study Mitochondrial Biology: General Considerations and Basic Procedures. Studying Mitochondria in An Attractive Model: *Schizosaccharomyces pombe*. *Neurospora crassa* as a Model Organism for Mitochondrial Biogenesis. Isolation of Intact, Functional Mitochondria From the Model Plant *Arabidopsis thaliana*. *Chlamydomonas reinhardtii*: The Model of Choice to Study Mitochondria From Unicellular Photosynthetic Organisms.

Genetics and Molecular Biology

Saccharomyces cerevisiae Mitochondrial DNA Recombination. End Mapping and Analysis of the Yeast by Inducible RNA Interference. Replicating Mitochondrial DNA. **Part III.** Mammalian Mitochondria: Large-Scale Isolation of Mitochondrial Ribosomes From Mammalian Tissues. Protein Import Into Isolated Mitochondria. Analyzing Import Intermediates of Mitochondrial Proteins by Blue Native Gel Electrophoresis. In Vitro and In Vivo Protein Import Into Plant Mitochondria. Two-Dimensional Blue Native/Blue Native Polyacrylamide Gel Electrophoresis for the Characterization of Mitochondrial Protein Complexes and Supercomplexes. Investigation of Iron-Sulfur Protein Maturation in Eukaryotes. Studying Proteolysis Within Mitochondria. **Part IV. Physiology.** Methods to Determine the Status of Mitochondrial ATP Synthase Assembly. ATP Production in Isolated Mitochondria of Procyclic *Trypanosoma brucei*. Oxidative Stress and Plant Mitochondria. Measuring Mitochondrial Shape Changes and Their Consequences on Mitochondrial Involvement During Apoptosis. Assessing Mitochondrial Potential, Calcium, and Redox State in Isolated Mammalian Cells Using Confocal Microscopy. **Part V. Dynamics and Morphology.** Live Imaging of Mitochondria in Yeast. Mitochondrial Fusion In Vivo. Conventional and Immunoelectron Microscopy of Mitochondrial Division in *Caenorhabditis elegans*. **Part VI. Functional Genomics.** Yeast Mitochondrial Transcriptomics. Plant Mitochondrial Transcripts by Quantitative RT-PCR. Proteomics of Yeast Mitochondria. Mitochondrial Proteomics. MitoP2, an Integrated Database of Mitochondrial Proteins. Index.

Yeast. Large-Scale Isolation of Mitochondrial Ribosomes From Mammalian Tissues. Protein Import Into Isolated Mitochondria. Analyzing Import Intermediates of Mitochondrial Proteins by Blue Native Gel Electrophoresis. In Vitro and In Vivo Protein Import Into Plant Mitochondria. Two-Dimensional Blue Native/Blue Native Polyacrylamide Gel Electrophoresis for the Characterization of Mitochondrial Protein Complexes and Supercomplexes. Investigation of Iron-Sulfur Protein Maturation in Eukaryotes. Studying Proteolysis Within Mitochondria. **Part IV. Physiology.** Methods to Determine the Status of Mitochondrial ATP Synthase Assembly. ATP Production in Isolated Mitochondria of Procyclic *Trypanosoma brucei*. Oxidative Stress and Plant Mitochondria. Measuring Mitochondrial Shape Changes and Their Consequences on Mitochondrial Involvement During Apoptosis. Assessing Mitochondrial Potential, Calcium, and Redox State in Isolated Mammalian Cells Using Confocal Microscopy. **Part V. Dynamics and Morphology.** Live Imaging of Mitochondria in Yeast. Mitochondrial Fusion In Vivo. Conventional and Immunoelectron Microscopy of Mitochondrial Division in *Caenorhabditis elegans*. **Part VI. Functional Genomics.** Yeast Mitochondrial Transcriptomics. Plant Mitochondrial Transcripts by Quantitative RT-PCR. Proteomics of Yeast Mitochondria. Mitochondrial Proteomics. MitoP2, an Integrated Database of Mitochondrial Proteins. Index.

978158296672

生物科学 ZD-N-HSV



RMB 1234.00

2007-09

9 158296672
 中国科学院图书馆进口部
 中国科学院图书馆进口部

ISBN 978-1-58829-667-2



Methods in Molecular Biology™ • 372

MITOCHONDRIA: PRACTICAL PROTOCOLS

ISBN: 978-1-58829-667-2 E-ISBN: 978-1-59745-365-3

ISSN: 1064-3745

humanapress.com